

What is claimed is:

1. A projection lens having an object plane and an image plane and comprising objectwise to imagewise:

a first lens group having negative refractive power;

a second lens group having a positive refractive power;

a third lens group having a negative refractive power;

fourth, fifth and sixth lens groups having overall positive refractive power;

the projection lens having a numerical aperture of at least about 0.85; and

wherein the projection lens has a $1\frac{1}{2}$ waist construction with a $\frac{1}{2}$ waist being defined in the first lens group and a primary waist being defined in the third lens group.

2. The projection lens of claim 1, wherein each of the lens elements in the third lens group has a negative refractive power.

3. The projection lens of claim 1, wherein each of the lens elements in the fourth lens group has a positive refractive power.

4. The projection lens of claim 1, wherein the fifth lens group has at least five lens elements with at least four lens elements in the fifth lens group having positive refractive power.

5. The projection lens of claim 1, wherein a most object forward lens element of the first lens group has strong positive refractive power which in part defines the $\frac{1}{2}$ waist in the first lens group.

6. The projection lens of claim 1, wherein the first lens group has more lens elements with negative refractive power than lens elements with positive refractive power.

7. The projection lens of claim 1, wherein a conjugate aperture stop is located between the fourth lens group and the fifth lens group.

8. The projection lens of claim 1, wherein the projection lens includes at least six aspheric surfaces.

9. The projection lens of claim 1, wherein the first six object forward lens elements are free of convex aspheric surfaces.

10. The projection lens of claim 1, wherein a diameter of each of the first five object forward lens elements is about equal to a diameter of the object plane.

11. The projection lens of claim 1, wherein a Ca/Cb ratio of less than 1.60 is maintained on convex aspheric surfaces that are associated with either one of the two most object forward lens elements of the system.

12. The projection lens of claim 1, wherein a Ca/Cb ratio of less than 2.35 is maintained on convex aspheric surfaces that are associated with either the third or fourth most object forward lens elements.

13. The projection lens of claim 1, wherein a first or second most object forward lens element has a concave aspheric surface and a Ca/Cb ratio is maintained at greater than or equal to about 0.70.

14. The projection lens of claim 1, wherein a third or fourth most object forward lens elements has a concave aspheric surface and a Ca/Cb ratio is maintained at greater than or equal to about 0.45.

15. The projection lens of claim 1, wherein negative refractive power is concentrated in a $\frac{1}{2}$ waist formed in the first lens group and a primary waist formed in the third lens group.

16. The projection lens of claim 1, wherein the fourth and fifth lens groups are free of lens elements that have aspheric surfaces.

25. The projection lens of claim 22, wherein the at least one other lens group includes at least four lens elements that each has a negative refractive power.

26. The projection lens of claim 22, wherein the first lens group has at least three lens elements that each has a negative refractive power.

27. The projection lens of claim 22, wherein the projection lens includes at least 25 lens elements and at least nine aspheric surfaces.

28. The projection lens of claim 22, wherein a most object forward lens element has a strong positive refractive power.

29. A projection lens having an object plane and an image plane and comprising objectwise to imagewise:

a first lens group formed of at least four lens elements and having a negative refractive power and defining a secondary waist of the projection lens;

an intermediate lens group having a negative refractive power and defining a primary waist of the projection lens; and

wherein the six most object forward lens elements are free of aspheric convex surfaces and wherein the two most image forward lens group defined by at least 6 lens elements are free of aspheric surfaces.

30. A projection lens having an object plane and an image plane and comprising objectwise to imagewise:

a first lens group having negative refractive power;

a second lens group having a positive refractive power;

a third lens group having a negative refractive power;

fourth, fifth and sixth lens groups having overall positive refractive power; and

wherein the projection lens has a $1\frac{1}{2}$ waist construction and wherein a $\frac{1}{2}$ waist is defined in the first lens group and a primary waist is defined in the third lens group and is free of aspheric surfaces and wherein the fourth and fifth lens groups are free of aspheric surfaces.